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Using A Wargame to Explore the Effects of the Information Content of Messages on CVBG Anti-Air Warfare Defense

by

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This thesis is an example of using a man-in-the-loop wargame to analyze the effects of information content of messages on carrier battle group anti-air warfare (AAW) defense. This is accomplished by examining three levels of information content of messages: Low, Medium, and High. The Research, Evaluation, and System Analysis (RESA) wargame is used to compare three carrier air defense scenarios. The forces attacking the carrrier battle group in each scenario are scripted to allow uniformity of each scenario across players. By analyzing the number of hostile aircraft penetrating the carrier battle group defenses during a specific scenario with a given level of information resolution, a correlation between information resolution and carrier defensive capabilities is evaluated. Using four warfare designated officers as AAW warfare commanders, results indicate that information resolution directly contributes to the defensive capability of the carrier battle group.

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LIST OF ABBREVIATIONS

AAW .....Anti-Air Warfare

AAWC.....Anti-Air Warfare Commander

A-6 E.....Medium Range Bomber Aircraft

CAP.....Combat Air Patrol

CBG.....Carrier Battle Group

CBGC.....Carrier Battle Group Commander

EMCON.... Emissions Control (Electronic)

E-2C.....Long Range Early Warning Aircraft

F-14.....Long Range Fighter Aircraft

F/A-18.....Short Range Fighter and Attack Aircraft

NM.....Nautical Mile (1.15 Statute Mile)

RECON....Reconnaissance

RESA.....Research, Evaluation, and System Analysis

ROE.....Rules of Engagement

S-3B.....Long Range Antisubmarine Aircraft

WW II.....World War Two (1939-1945)

I. INTRODUCTION

A. BACKGROUND

1. The Need For Alternatives

With decreasing budgets, a fact of life for the military, new or untried methods of test and evaluation must be employed to avoid the tremendous outlay of capital to develop new command, control, and communications capabilities. The best time to test is while the upgrade or concept is in the Concept Development Phase of the acquisition process. This means that decisions could be made prior to research and development money being spent. In the case of communication development, a known set of information inputs could be synthesized from a basic concept using wargaming to evaluate the communications inflow to an operational force. In this case a Carrier Battle Group (CBG) was chosen. Three main questions will be addressed in this study:

1. Can a wargame simulation provide the mechanism for an accurate evaluation of communications input to a carrier battle group?

2. Can a wargame provide a generic method for acquisition planners to simulate the value of communications information in an anti-air warfare environment?

3. Will a statistical analysis of an event driven simulation provide a basis for the use of wargames to test proposed communications upgrades ?

2. Model Alternatives

a. Warfare Styles

The four styles of warfare included for discussion are tactical, operational, regional and strategic. Each will be briefly outlined. The tactical style of warfare includes small scale insertion or strike into cooperative or uncooperative nations, illustrated by the invasion of Grenada in 1985 by the United States. The number of personnel involved is approximately 5000 land troops or less. Sea power involved would consist of a carrier battle group or less.

The second style of warfare is the operation scale, best represented by Desert Storm in 1991. The size of the battle is limited to a single enemy with moderate to large scale fighting abilities. This aggression is met with a single or coalition force. The number of personnel involved will extend to approximately four divisions or more on each side. The operational scale of warfare is the level currently assessed by the government of the United States to be the largest scale of warfare in which we, as a nation, will engage.

The third style of warfare is a regional conflict, involving a geographic area which includes several countries. Two coalition forces comprised of several of our allies engage in large scale warfare. An example of this style would be if Ukraine and Russia came to the "aid" of Lithuania in

conflict with Poland. On the Polish side, the United States and Great Britain could come to Poland's "aid". This warfare is not quite global; however, it involves a large continental style of warfare.

The last style of warfare to be discussed is the strategic level, characterized by a global conflict similar to WWII. The military engagements in this scenario include a variety of large and small scale battles that occur in several geographic locations and environments. This scale of warfare can also include thermonuclear exchange.

The decision on which wargame to use is based on what level of warfare is considered for analysis. In a strategic conflict too many variables need to be analyzed in order to evaluate communication upgrades for reasonable results to be established. In either tactical, operational or regional conflicts the scale of warfare is such that accurate information can be postulated by examining a limited conflict.

b. Types of Simulations

(1) Systemic. Determining the effect of increased information resolution to a CBG could be done via two methods. The first is by use of a systemic simulation. A systemic simulation is one in which people are not involved in decision-making during the running of the simulation. All decisions in the game are made by a series of algorithms written into the program prior to the simulation run. A database of weapons, capabilities, and

associated information is stored for use by the simulation. Once this information is loaded into the program, the computer will run the simulation to the time or the event scheduled for simulation conclusion. By varying the inputs a pattern of results may develop over a series of runs.

(2) Man in the Loop. A man-in-the-loop wargame is one whereby a person or group of people interact with decision inputs during execution of the wargame. The inputs to the wargame are at various levels. Both sides of a conflict may have human control or one side can be fully automated. Automated responses can be added to both sides to minimize the amount of inputs required to run the wargame. To a new wargame commander the idiosyncrasies of game operation may cause the person to ignore significant events while trying to input commands to the wargame. In order to keep the wargame a test of strategy, certain assumed actions may be automated to reduce inputs.

c. Model Selection

A choice must be made between having personal biases inputted to a wargame or to have algorithms make all decisions during the simulation. The contrasting approaches must be examined for each application. The algorithms in a simulation take decisions and reduce them to mathematical or logical expressions. In the case of simulating a ship's transit across the Atlantic a simulation might best be suited. Several actions

can be expressed by algorithms. A few examples of repetitive actions would be :

-The probability of mechanical failure occurring during a lapse of time or the distance traveled.

-The average speed of advance expected due to certain mechanical failures. This would include repair times.

-The effect on the speed of advance by sea state or weather.

These are a few of the inputs that this example could operate within. All these actions could be simulated by a probability of occurrence and predetermined reaction times. If the system to be evaluated is repetitive or predictable in nature and the actions are truly random, then a simulation would be the desired choice. By running the simulation several times the results of each run can be examined, and trends can be arrived at by statistical computation.

When discussing a wargame the main perception to keep in mind is that there is some control given to human operator(s). This control can vary in intensity with each wargame. The idea behind a wargame is that the tactics of the commander are tested. The commander has enough control to change the outcome of a battle. Certain commands that are repetitive or unchanging can be automated to relieve the commander of needless command inputs. An example of this situation is the use of a Standard Missile 2 defensive surface-to-air missile. This missile is used to engage incoming

enemy aircraft or cruise missiles. As long as a contact is labeled hostile, a missile will be fired at its optimum range. As long as contact classification is correct this defensive action can be automatic.

The Carrier Battle Group Commander (CBGC) has absolute control of all offensive action taken by the CBG. However the CBGC can designate person(s) to handle the defensive actions of a CBG. These commanders handle several areas such as anti-air warfare, anti-surface warfare, and antisubmarine warfare. This list is not complete but covers some major areas of responsibility. When dealing with the defense of an aircraft carrier, plans can change within an instant. This high pressure environment, along with little response time, requires a level thinker and command presence. These decisions can be based on fact and experience. A fact is something that can be programmed with algorithms; however experience has little to do with algorithms. Significant battles throughout history have shown that unorthodox tactics and leadership abilities have been a successful combination. Taking this information into account, a man-in-the-loop wargame was selected.

II. PROBLEM DEFINITION AND MODEL DEVELOPMENT

A. PROBLEM DEFINITION

The primary problem to be investigated is to ascertain how various information packages affect the Anti-Air Warfare (AAW) mission of the CBG. For carrier battle group operations, valid and usable information input is essential to enable the CBGC (Blue Forces) to make decisions. Decisions for the defense of the battle group are directly related to the type and content of information received by the CBGC.

The amount and quality of information directly affect the assets that the CBGC assigns to defense, as well as organic (battle group) information collection. Without information the CBGC uses most of its assets in the search for threats that may exist. The impact of this information input is the intent of this study.

The information inputs to the CBG (Carrier Battle Group) have two sources: inorganic and organic. Inorganic sources are information that is provided to the CBG from origins outside the carrier battle group. Such information as high altitude imagery, information gathered by national assets, and local area sources are all transmitted to the carrier battle group. Organic sources are information inputs from forces controlled by the CBGC.

Several origins of information are available to the CBG:

- Radar contacts
- ESM (Electronic Support Measures) contacts
- Visually identified contacts
- Voice radio transmissions

Radar contacts can be received from shipboard sources or airborne assets that have used their own radar unit to locate ships and aircraft. ESM contacts are an interception of electronic emissions of ships and aircraft. These emissions are usually radar in origin and can be intercepted passively (without the source of the emission becoming aware of detection). Visually identified contacts can be from aircraft or shipborne lookouts. Finally, interceptions of radio message traffic can indicate ships or aircraft in the area.

In this study a single aspect of carrier battle group operations was selected. By focusing on one area of operation in the battle group an analysis can be made of the impact of information regarding CBG defense. The aspect of operations that this study analyzes is the anti-air warfare (AAW) portion of carrier defense. When any engagement is evaluated the primary measure of effectiveness is who survived and their operational status. Chapter IV describes the analysis methodology.

B. DEFINITION OF PARAMETERS

1. Blue Forces

When dealing with the air defense of a CBG the main weapons of choice are standoff weapons. Standoff weapons allow the CBG to eliminate any threat before the hostile force has the ability to fire their weapons at the battle group. The primary standoff weapons for the CBG are aircraft. When a CBG is approaching a possible hostile area the CBGC will deploy an initial package of assorted aircraft to put a protective sphere of influence around the carrier. A protective sphere of influence describes an area of airspace and ocean around the carrier that is controlled by the CBG. This allows the battle group to know the location of all ships and aircraft within this sphere. By controlling this sphere no hostile influences are allowed to endanger the CBG.

The number and type of each aircraft launched, as well as their location from the carrier, is unique to each CBGC. A broad template will be outlined for a probable makeup of forces. Package One will usually include two to five Combat Air Patrols (CAPs). Each CAP consists of two to three fighter aircraft. These aircraft could be F-14 Tomcats or F/A-18 Hornets. The aircraft would be armed with air-to-air missiles so that any hostile aircraft can be engaged. Due to their high performance, fighters cannot sustain extended flight times without refueling. Additional support aircraft designated for aerial refueling will be dispatched with the CAPs to allow the fighters to remain airborne longer than one hour. The refueling aircraft could

be the A-6E Intruder bomber or the S-3B Viking antisubmarine aircraft, both having the same refueling stores attached. The final piece of Package One will be the launch of one to three E-2C Hawkeye early warning aircraft. These aircraft possess no armaments but are equipped with long range radar to extend the radar horizon of the CBG. With both air-to-air and surface search radars their effective line of sight is approximately 200 nautical miles (NM).

The next phase of operations is detection. Detection is the identification of known or unknown platforms that are operating within the carrier's sphere of influence or possess some potential threat to the CBG. Once a platform has been identified as unknown or hostile, a reaction to detection or Package Two will most likely be dispatched to intercept and positively identify the platform. The aircraft dispatched are usually fighter aircraft previously launched as CAPs. If unknown air platforms are positively identified as hostile through the Intercept/Fire and permission to fire is given, the fighter aircraft dispatched will target and fire on these hostiles with air-to-air missiles.

The engagement will result in a possible action with a possible launch of Package Three. If the hostile aircraft have been destroyed then no further action is needed. However, if the hostile aircraft are not destroyed then

Package Three, consisting of more CAP aircraft, may need to be dispatched to further prosecute the hostile(s).

2. Orange Forces

The enemy (Orange Forces) forces have a different agenda than the blue forces, i.e., firing their weapons at optimum range at the CBG. From the enemy's perspective their job is to locate the CBG and launch their cruise missiles, thus disabling the mission capability of the battle group. The first package launched is the Maneuver/Search assets to locate the carrier and her escorts. A variety of search aircraft are available from enemy sources; these and other enemy aircraft choices will be discussed in Chapter III.

The Manuver/Search phase will be followed by a detection of other forces. The Maneuver/Search package will be followed by a Reaction Package Two consisting of long range bombers or attack aircraft. These aircraft will attempt to maneuver close enough to the carrier group to fire their weapons at optimum range. The Manuver/Fire segment will occur prior to weapons launch. An additional objective of Orange Forces is to remain covert as long as possible in order to reduce their losses prior to weapons launch. A balance between remaining covert and engaging the battle group quickly is a difficult feat to accomplish.

The final aspect of the strike is the Result Phase, determining whether or not the weapons are able to be launched and the outcome of their

firing. If sufficient damage is sustained by the battle group to reduce the threat of the enemy then no further action is necessary. If, however, the carrier group still poses a threat then a Reaction strike may be launched to complete the mission.

C. MODEL ALTERNATIVES

At the Naval Postgraduate School warlab, two main wargames are available. These are the Joint Theater Level Simulation (JTLS) and the Research, Evaluation, and Systems Analysis (RESA). Both models allow human interaction with the game. There are significant differences between these simulations that need to be discussed in order to arrive at a correct choice.

1. Joint Level Theater Level Simulation (JTLS)

JTLS is a computer-assisted simulation that models two-sided air, ground, and naval combat with logistical and intelligence support. It is designed as a theater-level model for use in the following areas:

1. The analysis, development, and evaluation of contingency plans and joint tactics.

2. The evaluation of alternative military strategies.

3. The analysis of combat systems.

The first JTLS model became operational in September, 1983. Now in its ninth release (Version 1.65C), JTLS is owned by the Force Structure, Resource, and Assessment Directorate (J-8) of the Joint Chiefs of Staff. [Ref. 1: p. 9]

This system was designed for the joint style of engagements and does contain a naval module. This module only portrays the U.S. Navy as operating off the coast of an enemy. The Navy, until recently, has usually operated in an open ocean or "blue water" environment. This type of naval engagement does not model well the desired war-at-sea engagement. Although the Anti-Air Warfare Commander will require some training for any wargame, JTLS requires a three to four week training evolution to become familiar with the most basic command sequencing. All of these factors led to a decision not to use JTLS.

2. Research, Evaluation, and System Analysis (RESA)

The Research, Evaluation and Systems Analysis (RESA) Facility provides a computer-based simulation of the naval warfare environment that is capable of supporting a wide variety of research and development efforts as well as training for senior officers. The design of the RESA simulator has focused on the command and control of naval battle group/ force operations, with developments in progress to provide a simulation of the joint warfare environment. The range of the operations that can be simulated with RESA extends from theater-level operations through single platform operations. The system is designed for interactive control of simulated forces, with man-in-the-loop command decisions forming a part of the simulation; however, capabilities exist to script a scenario and to replay it numerous times for statistical analysis. A capability also exists to generate realistic, scenario-driven data streams in various formats to simulate fleet or prototype command and control data processors to support shipboard training, system testing, interoperability assessment, or similar applications. The simulator may be operated as a distributed system, with interactive participants at various sites. [Ref. 2: p. 1]

3. Selecting The Model

The RESA wargame was chosen for several reasons:

1. The game is designed for a naval engagement similar to that selected for this thesis.

2. RESA satisfies the operational level of warfare described in the Problem Definition.

3. A scripted naval scenario needed for this thesis was easier to accomplish than with the JTLS simulation.

III. RESA WARGAME AND SCENARIO DESCRIPTION

A. BACKGROUND

1. RESA Wargame

The Research, Evaluation, and Systems Analysis (RESA) wargame provides the range of operations necessary for this study. The RESA wargame is a computer-based simulation of a naval environment for training and for research and development requirements.

2. Personnel Requirements

The wargame as designed for this study employed the use of aviation unrestricted line officers to play the Carrier Battle Group Commander's designated anti-air warfare commander (AAWC) for defense. The primary choices were resident senior officers that are instructors at the Naval Postgraduate School and junior aviation officers that are students as alternates. The operators of the wargame were warlab technicians that input the AAWC orders into the wargame. This process gives the wargame as near real time reaction as possible. Without the use of the trained technician, hours of instruction to the AAWC would be necessary to realize the required proficiency to operate the game.

B. SCENARIO DESCRIPTION

1. Base Force

There were three different scenarios that each commander played. Each engagement lasted approximately 50-60 minutes of real time which equated to 110-120 minutes of game time. The Blue and Orange forces involved remained the same for each scenario; however the geographic locations and information resolution varied for each scenario.

In order to observe the results of the wargame in detail, a decision was made early to observe only one aspect of the defense of a carrier battle group. The AAW environment allows a fast paced and realistic test of a AAWC. A proposal to integrate the battle group warfare departments will be explored in the conclusions and recommendations chapter of this study. By restricting the scope of the wargame, an impact analysis of communications input to a CBG was evaluated. The Blue forces consisted of a carrier battle group with seven support ships (see Table 1). The Orange forces had three generic bases with varying airborne strike weapons (see Table 2). All aircraft weapons and ranges for this wargame are listed in Table 3 for the Blue forces and Table 4 for the Orange forces, respectively. The characteristics of all weapon parameters are derived from UNCLASSIFIED sources. The sources used were the Jane's series of handbooks on warfare equipment.

TABLE 1 (BLUE FORCES)

NAME (Class)	APPLICABLE WEAPON SYSTEMS			
USS ABRAHAM LINCOLN (Nimitz Class Carrier)	20 F-14 Tomcat (Fighter)	28 F/A-18 Hornet Fighter/ Attack	11 KA-6D Tanker	8 A-6E Intruder Bomber
	8 S-3B Viking Anti-Sub	5E-2C Hawkeye Early Warning	SM-2MR Surf-to-Air Missile	CWIS Point Defense
USS STERRET (Belknap Cruiser)			SM-2ER Surf-to-air Missile	CWIS Point Defense
USS YORKTOWN (Ticonderoga Cruiser)			SM-2ER Surf-to-air Missile	CWIS Point Defense
USS SPRUANCE (Spruance Guided Missile Destroyer)			SM-1MR Surf-to-air Missile	CWIS Point Defense

TABLE 1 CONTINUED				
USS KIDD (Kidd Destroyer)	Sea Sparrow Surface-to -air Missile			CWIS Point Defense
USS PERRY /ANTRIM /MOOSEBURGER (Oliver Perry Frigate)			SM-1MR Surf-to-air Missile	CWIS Point Defense

2. Assumptions

The first assumption to be made is that the Orange forces striking the carrier battle group have perfect knowledge. The intent of this study is to examine the decisions made by the AAWC. These decisions are based on information gained from message traffic delivered to the AAWC. Under no circumstances does the Orange force foreknowledge of the CBG location affect the message traffic incoming to the AAWC. If Blue forces were made aware of Orange force perfect knowledge, then EMCON and avoidance of enemy targeting would be pointless. This information was withheld from the AAWCs to allow as much realism in their reactions as possible. This first assumption

TABLE 2 (ORANGE FORCES)

BASE 1	15 Backfire Bomber	45 AS-6 Cruise Missile	10 Mig-31 Interceptor	30 AA-9 Air-to-Air Missile
	2 Bear-D Surface Reconnaissance	3 IL-78 Tanker	2 IL-76 Air Reconnaissance	20 AA-11 Air-to-Air Missile
BASE 2	15 Backfire Bomber	45 AS-6 Cruise Missile	10 Mig-31 Interceptor	30 AA-9 Air-to-Air Missile
	2 Bear-D Surface Reconnaissance	3 IL-78 Tanker	2 IL-76 Air Reconnaissance	20 AA-11 Air-to-Air Missile
BASE 3	15 Backfire Bomber	45 AS-6 Cruise Missile	15 Fulcrum Fighter	30 AA-10 Air-to Air Missile
	2 Bear-D Surface Reconnaissance	3 IL-78 Tanker		30 AA-11 Air-to-Air

TABLE 3 BLUE FORCE WEAPONRY

WEAPON	*NATO NAME*	*TYPE*	*RANGE* (NM)
Sea Sparrow	SAME	Surface-to-Air Missile	7
SM-1MR	Standard Missile 1	Surface-to-Air Missile	50
SM-2ER	Standard Missile 2	Surface-to-Air Missile	90
CWIS	SAME	Anti-Missile Point Defense	2
Phoenix	SAME	Air-to-Air Missile	60
Sparrow	SAME	Air-to-Air Missile	30
Air-to-Air Missile	SAME	Air-to-Air Missile	40
Sidewinder	SAME	Air-to-Air Missile	9

TABLE 4 ORANGE FORCE WEAPONRY			
WEAPON	*NATO NAME*	*TYPE*	*RANGE* (KM)
AA-9	Acrid	Air-to-Air	70
AA-10	Alamo	Air-to-Air	35
AA-11	Atoll	Air-to-Air	8
AM-39	Exocet	Cruise Missile	50
AS-3	Kangaroo	Cruise Missile	650
AS-4	Kitchen	Cruise Missile	400
AS-6	Kitchen	Cruise Missile	400

reduces the game time by eliminating the need for Orange forces to search for the Abraham Lincoln and her escorts.

The second assumption is that search aircraft from both sides are launched as the game begins. For the Orange forces one IL-76 May Air reconnaissance aircraft is launched as well as one Bear-D surface reconnaissance aircraft. The Blue forces have one Combat Air Patrol (CAP) consisting of two F/A-18 Hornets with a weapons loadout of four Sparrow air-to-air missiles and two Sidewinder air-to-air missiles (see Table 3 for ranges). This CAP is located at a range of 200 Nautical Miles (NM) from the

carrier along the CBG intended track. In addition, two E-2C Hawkeye early warning aircraft a located at a range of 200 NM from the carrier at thirty degrees either side of the carrier's intended track. A KA - 6D airborne tanker is collocated with the E-2C. All aircraft launched have 100% fuel onboard when their stations are reached to simulate refueling having taken place.

The third assumption is that the CBG is located approximately 835 NM from the closest hostile base. This reduces the amount of flying time necessary for enemy aircraft and thus reduces the playing time required.

The fourth assumption is that all enemy and friendly base forces are constant in all three scenarios. This assumption maintains a level of consistency for the AAWC and reduces the briefing time for the warfare commanders prior to each game. However, the tactics are different for each strike. Each of the scenarios will be described briefly below to allow the reader to judge the intensity of each conflict.

The fifth assumption is that each Orange force bomber carries only one air-to-surface missile. This allows a wider threat axis from Orange forces without overwhelming the AAWC. In addition this assumption allows a missile firing to also represent a hostile aircraft penetrating the CBG defense net.

The last assumption made was that each player played the same sequence of scenarios. The order of scenarios played are Scenarios One, Two, and Three.

3. Message Traffic

In each of the scenarios the AAWC received two messages per game played. The timing of the delivery of these messages was the same in each game due to the fact that Orange forces did the same thing in each game. This allowed the impact of the message traffic to be evaluated uniformly from player to player. A random number generator helped to decide the first two and the last player's information resolution. The message traffic had three levels of resolution: Low, Medium, and High. Each level of information had an equal chance of being picked for the first player. Once chosen, the two remaining resolutions had an equal chance of being picked for the second player. Once this level was chosen for the second player the remaining resolution level went to the third player. The fourth player had an equal chance of receiving any of the three levels of resolution. This process was repeated for each of the three scenarios. A description of the message contents is listed in Appendix A.

4. Scenario Overview

Although each scenario has the same resources with which to engage, the Orange forces did not use all forty-five Backfire bombers in each game. Scenario One served as a learning experience for each player so the player

could understand the method of play. Therefore, Scenario One only used two flights of five and two flights of three Backfires for the assault. The threat axis for the carrier was approximately one hundred fifty degrees. This was enough firepower to test the commander but not sufficient to overwhelm the CBG in the first game.

Scenario Two was progressively more difficult. Five flights of five bombers were used to assault the carrier battle group. These five flights used a threat axis against the carrier of approximately two hundred fifty degrees.

Scenario Three was the most difficult of the three scenarios. Seven flights of five bombers were used for the Orange force attack. The threat axis was approximately three hundred thirty degrees against the Blue forces.

5. Scenario One

Due to the downsizing of Iraqi forces as a result of Operation Desert Storm, Iran has emerged from the conflict as the regional power in Southwest Asia. A massive arms procurement program has made Iran's defenses formidable. In a recent clash with Organization of Petroleum Exporting Countries (OPEC) on oil pricing, Iran has declared the Straits of Hormuz as being the territorial waters of Iran. This declaration includes all air space over the straits.

The mission of the Abraham Lincoln Carrier Battle Group is to insert the battle group through the Straits of Hormuz into the Persian Gulf and reestablish the international waterway and airway as quickly as possible. Iran has threatened to sink any ship coming in or out of the Persian Gulf. Recent aircraft patrols indicate that Iran plans to stand behind their blockade. The battlegroup is to expect heavy airborne resistance. Additional intelligence surmises that Iranian overflights of local neighbors may be possible due to the corrosive stance of Iran. An air strike of three flights of five Backfire bombers will engage the CBG.

6. Scenario Two

During a recent reunification summit between China and Taiwan an argument over local forms of government has resulted in an international incident. China has decided to retake Taiwan by force. China now occupies southern Taiwan with an operational air base. In addition, China has taken this opportunity to seize Batan Island. China has anticipated the world's condemnation and has threatened any ship of war or aircraft operating in the South China Sea. The Lincoln battle group is to steam into the South China Sea and establish the first international presence. China's reaction to this provocation can not be estimated at this time. If engaged, the commander of the Lincoln battle group is to engage and defend the group with vigor. The

key word is to defend. Under no circumstances is the battlegroup to engage in land strike warfare without permission from higher authority.

7. Scenario Three

After the fall of the Soviet Union a group called the New Soviets has taken over in western Russia. In taking power, the New Soviets have nullified a recent agreement to return the Kuril Islands to Japan. The Japanese have repopulated the islands only to find New Soviet troops invading their newly acquired territory. After some resistance, civilian casualties were heavy. The New Soviets classify the Kuril Islands as their territory and are prepared to back their claim. The Lincoln battle group is to test the resolve of the New Soviets and sail into the area. Although more of the fleet is steaming to the area, the Lincoln battle group will be the first on scene. Airborne attack is likely, however a reminder is that the battlegroup will defend itself only if attacked. This is to give the National Command Authority time to make a decision whether to engage in a regional conflict.

8. Rules of Engagement

Patrols of Anti-Surface Warfare (ASUW) aircraft can be expected in all scenarios. Any overt runs of these aircraft at the CBG will be warned by radio communications. This is limited to offensive platforms. If no response is given by offensive aircraft the flight may be engaged. Any hostile aircraft within weapons range will be engaged. Any surveillance aircraft may be engaged if the platform penetrates within 150 nm of the CBG. If possible,

any known hostile aircraft will be engaged prior to hostile reaching maximum weapons range. Engagement range will be determined by the Battle Group Commander's assessment and resources available. A listing of the briefings given to each player is given in Appendix B.

IV. ANALYSIS METHODOLOGY

A. QUESTIONS

Recall that the questions posed for the thesis were stated in Chapter I as follows:

- Can a wargame simulation provide the mechanism for an accurate evaluation of communications input to a carrier battle group?

- Can a wargame provide a generic method for acquisition planners to simulate the value of communications information in an anti-air warfare environment?

- Will a statistical analysis of an event driven simulation provide a basis for the use of wargames to test proposed communications upgrades ?

B. PARAMETERS

The RESA wargame scenarios have been developed, however a review of the parameters will be used for a discussion of the Measures of Effectiveness in the following section. The evolution of this wargame consisted of two dependent timelines being followed. The first timeline was followed by the Blue forces and the second by the Orange forces. These timelines are shown in Figures 1 and 2 for the Blue and Orange forces, respectively.

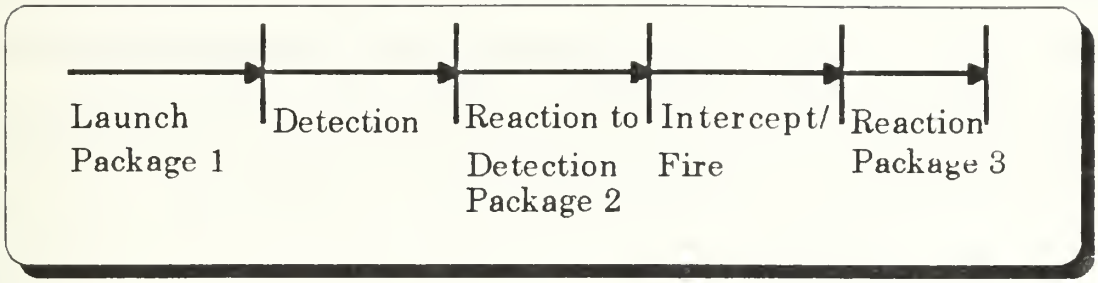

Figure 1 Blue Force Timeline

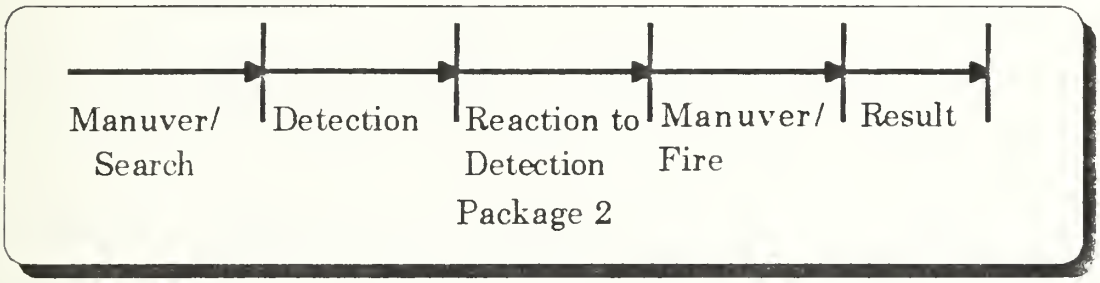

Figure 2 Orange Force Timeline

These timelines are generic in nature, and a detailed analysis of the Blue force reactions will be examined in Chapter V. In the case of the Orange forces, all actions were preprogrammed as much as possible to allow consistency of scenarios between the different AAW commanders.

C. MEASURES OF EFFECTIVENESS (MOES)

1. Primary MOE

The primary Measure of Effectiveness in this analysis is the number of hostile aircraft penetrating to the battlegroup. Recalling from the Assumptions section that each hostile aircraft carries one air-to-surface

missile, the number of missiles launched from the hostile aircraft is an identical measure. The measurement of the number of missiles launched is simple but the events leading up to the missile firing must be considered. To accomplish this analysis, secondary MOEs must be developed.

2. Secondary MOEs

The main secondary MOE is the time to detect and intercept incoming enemy aircraft. If the carrier was destroyed or platforms within the battle group disabled, an in-depth look at the timing of events yields a greater understanding of decisions made by the AAWC. The time and location of package launch is based on information obtained by inorganic information and doctrine instilled in each AAWC. The AAWC will deploy an initial package and the result of this deployment may be a detection. An analysis of the reactions to information inputs is subjective, to a point. With the Orange forces being preprogrammed and constant in their action, information inputs will likely affect the initial location of early warning aircraft. Detection of the incoming raid is directly attributed to the placement of search aircraft.

The location and time of hostile aircraft intercepts also aids in the explanation of the survival or demise of the CBG. Each AAWC makes decisions based on the information at hand. In this study information was given at three levels of resolution: High, Medium, and Low. To analyze the information impact, a judgment must be made on how information packets

affect the placement of air assets. This analysis attempts to distinguish between individual tactics and the information content of the message traffic. The analysis of the AAWC's judgment will be paramount to evaluation of information content and its subsequent impact on carrier battle group defense.

The AAWC has many tactics that can be employed to defend the carrier. These differences will be discussed in Chapter V. With the variance in tactics there will be a difference in response time of each defensive sphere established. An additional secondary MOE will evaluate whether timely intercepts of unknown/hostile aircraft occurred. By evaluating initial positioning of forces and the revealed thought processes of each commander's tactics, the time differential between intercepts of hostile aircraft can be compared across commanders. This time differential will be based on the time to detection and what forces are available to intercept the platforms. The content of information will affect the timing as well as the number of fighter aircraft that will be airborne at the time of detection. If a majority of fighter aircraft are launched too quickly in response to an incoming raid then the organic refueling assets may be inadequate to keep the necessary CAPs airborne. If, however, the fighters remain on the carrier's deck too long they may not be able to intercept hostile aircraft prior to weapons launch. The positioning of reconnaissance aircraft will be critical in launching additional

aircraft in a timely fashion. Interpretation of these aspects of effectiveness are examined in Chapter V.

V. ANALYSIS

A. INFORMATION RECORDED

1. Notes taken during each wargame

A primary method of analysis used was information taken in the form the author's observations during the wargame. The time, number and ultimate location of each aircraft launched were noted. Although the quantitative information recorded is important to any good analysis, the primary information noted was the tactical awareness that each AAWC had as he took action to defend the battle group. Questions were asked periodically during each game to ascertain the reason why a particular action was taken by the AAWC. Each time a message was given to the AAWC his tactical awareness was probed. The comparison of what the AAWC felt was happening with the enemy and what actually happened is discussed in Section B of this chapter.

2. Detection log

One game-generated log that was printed at the end of each game played was the Detection Log. If a radar, electronic, or visual track was identified by either the Blue or Orange forces, a log was kept and stored by the game. In the instance of all the wargame simulations, the Orange force reactions were preprogrammed and no modifications to the Orange forces were allowed. Therefore examination of the detection log is not pertinent to

this analysis, since detection is directly related to timely intercepts of unknown/hostile platforms. With the current assumptions, analysis was accomplished more readily through the Engagement log.

3. Position Log

The Position Log gives the position of every platform at various points in time. This log includes both Orange and Blue forces. Since Orange forces are fixed, the placement of those platforms are known. In the case of Blue forces, the ship movements are restricted due to the short time frame of each game. The aircraft position log was taken by the author when appropriate, so the Position Log was unnecessary for analysis.. Time of platform launches as well as initial positioning was hand recorded.

4. Engagement Log

The Engagement Log was the most useful piece of game-generated data. This log provides the time of each engagement between Blue and Orange forces. In addition, the Engagement Log provides the platform engaging, the weapon used, the target, and the result of each engagement. The MOE is the number of aircraft/missiles launched which penetrated to the CBG and is used to answer the primary question of this thesis: Did varying information resolution affect the Anti-Air Warfare Commander's ability to defend the carrier battle group? The total Engagement Log would be used if the AAWC had control over the entire defensive posture of the battle group. Shipboard defenses such as the launching of surface-to-air missiles are

automatic within the RESA wargame. In addition the aircraft of the Orange forces are automated for each of the three scenarios. Because of these automated portions of the game, the number of cruise missiles launched by the Orange forces and subsequent lock-on of any Orange missiles penetrating the carrier aircraft defensive sphere are the data of interest from this log. A tabulation of the number of Orange Force missiles fired and subsequently locked-on is given in Table Five.

TABLE FIVE SCENARIO RESULTS

	Player 1	Player 2	Player 3	Player 4
Scenario 1	High Information	Low Information	Medium Information	Medium Information
Missiles Fired	11	7	9	11
Locked On Target	6	0	2	4
Scenario 2	Low Information	Medium Information	High Information	Low Information
Missiles Fired	10	7	8	5
Locked On Target	7	1	2	1
Scenario 3	Low Information	High Information	Medium Information	High Information
Missiles Fired	13	4	2	10
Locked On Target	8	0	0	2

B. SCENARIO ANALYSIS

1. Player Variance

a. Game Player Input

When considering the variance between players, the discussion begins with the fact that each player has a variety of information and experience to draw from. There were four players used for this analysis. The background experience of each player is given in Appendix C. The ranks of Players were from a Navy Lieutenant to a Navy Captain.

Player One had the disadvantage of being first. When this game began only one technician was available for command inputs. Although this arrangement was adequate for the initial setup and deployment phase, the technician was overwhelmed by the number of commands when the engagement phase began. As a result the intercepts of Orange forces were not as timely as the AAWC input commands, and several Orange force aircraft were able to fire even though Blue force aircraft were on station and available for intercepts. Therefore a second technician was added for subsequent runs. There were no other discrepancies among players.

b. Definition of Player Variance

(1) Proactive player. There were two types of player reaction: proactive or reactive. The proactive player received his message and began to gain control of the situation aggressively. This was based on what information was on hand and personal attributes. Usually the AACW

established what was wanted for the defensive sphere of influence to assume the Orange forces would to have to penetrate the defenses. As each of the subsequent scenarios unfolded, the situation was defined with increased tensions between Blue and Orange forces. The proactive player subsequently began launching more aircraft initially and reinforcements were preplanned to launch when certain criteria were met by the player. Player Two was the prototype for this style.

(2) Reactive Player. The reactive player always tended to initially launch a relatively small contingent of aircraft (on average two Combat Air Patrols and two E-2 reconnaissance aircraft). Support tankers were also launched to maintain the CAPs until a significant event occurred. That event tended to be a confirmation of the first message or contact with hostile aircraft inbound to the battle group. The defensive sphere was initially established with reconnaissance and other airborne assets until a clearer picture was established for the AAWC. Players One, Three, and Four tended to follow this style unless initial message traffic indicated a more aggressive stance for the Orange forces.

(3) The Players Defined. Player One tended to be a reactive player and established a defensible position with minimal CAPS. The player then reinforced his position once confirmation of the impending strike was given. This method of confirmation was either by message traffic or by Blue

force detection of Orange forces. This method did not change significantly as more information was given to Player One. Player One became very aggressive after confirmation of a possible attack, consistent with a reactive player. Due to the fact that Player One had a low resolution of information on the second and third scenarios, the missiles fired and locked on were higher than the other players.

Player Two was very proactive from the beginning. Complete and yet simple defensive grids were established early and only modifications to the initial grid were used as the scenarios unfolded. The basic core tactics remained constant. Player Two interpreted the political climate with a great deal of finesse. The AAWC drew on his experience and made sound and very proactive decisions. These decisions lead to one of the better performances from the commanders. The wealth of experience of Player Two made difficult decisions simpler and were usually made correctly. An example of this occurred during Scenario Three when immediately after reading the scenario background and the first message led to Player Two launching twenty eight fighter aircraft. The positions of the CAPs were such that no strike missiles had a chance to lock onto targets.

Player Three did not have carrier aviation experience and thus, the first game represented more of a learning experience than for the other players. Once armed with a understanding of fighter aircraft and their

fuel requirements, Player Three became increasingly more proactive as the scenarios unfolded. This can be attributed to the fact that the lowest form of information resolution given to Player Three was medium, giving him confidence in decisions that were made.

Player Four wanted to be extremely proactive in all three scenarios. In several cases the referee had to restate the Rules of Engagement to ensure that an act of war was not precipitated by the Blue forces. Once understanding of this fact was made clear, Player Four fared relatively well in each of the scenarios.

2. Observations

As referee, the main thing observed bt the author was how each player regarded the information messages provided. Several of the players waited until more information was provided even when other indications were evident. In Player One's Scenario Three, once the last message indicated an imminent attack, the deck launching was prompt. This is not to say that the players were slow in their actions, however prudent behavior could be implied in most cases for the decisions made. The need for accurate information was great, but once the players learned that the message traffic was accurate, the players put great trust in the message content and acted upon its contents. The resolution of the message was also a key factor. As expected, the High resolution messages were met with satisfaction and action by the player involved. The Low and Medium resolution messages were met

with some consternation about the level of resolution and were considered to be lacking in content. When Low resolution was given to any of the four players, the AAWC was not satisfied with the content or quality of the message.

3. Player Comparison

In each of the scenarios two of the players shared the same information level. An evaluation of these coinciding players will be made for each scenario. This evaluation is to establish whether the players who shared the same level of information resolution exhibited similar performance. At the onset Player One had a disadvantage of having only one technician for command input. This fact resulted in slower launches of key aircraft. Some intercepts would have been more timely if the commands were input quicker. This fact lead to some suppositions by the author during the analysis of Player One's results.

a. Scenario One

Player Three and Player Four shared the same Medium information resolution. It would be expected that the missiles fired and locked on would be close in numeric value. In Table 5 note that the number of missiles launched and locked on differed by only 2 in each category. Because this was the first game played by each player, this difference is not evaluated as significant. After the first game, unusual tactics were expected from Orange forces, even though they were not always correctly identified.

b. Scenario Two

Player One and Player Four shared the same Low resolution in Scenario Two. It would be expected that the ratio of missiles fired and missiles locked on would be higher than Scenario One for several reasons. The first reason is that the intensity of the scenario increased by ten Orange Force strike aircraft each time a consecutive scenario was played. A second reason is that the information resolution level went down from Medium in Scenario One to Low in Scenario Two. This expectation was not the case with Player Four, probably due to the learning curve effect of having already played Scenario One. As noted in Table Five, the number of missiles fired was five and locked-on missiles was one. Player One had several aircraft airborne in position, at the proper time. If the command inputs had been entered in a timely fashion, then it is possible that the results would have been much better in Scenario Two.

c. Scenario Three

In this scenario Player Two and Player Four shared the same information value of High resolution. Player Two had a very low missile count fired at Blue forces of four and no missiles locked-on. Player Four had more missiles fired with a count of 10 and two missiles locked-on. Player Two read the situation well and launched twenty eight fighter aircraft to repel the attack while Player Four had only twenty fighter aircraft airborne. Although Player Four was unable to engage all incoming aircraft, he did

have the ability to engage many incoming missiles with fighter aircraft prior to Orange force missile lock on. However, there was not enough of those forces launched to totally prevent Orange force missile firing and subsequent lock-on.

d. Conclusions

The number of missiles fired and locked on seem to match the initial statement that the same resolution ends up with approximately the same missile count for Scenario One. Both Player Three and Four had approximately the same experience level which gives credence to this observation. The higher experience level of Player Two was evident in Scenario One, even though he had a low level of information.

In Scenario Two the differences appear to be the number of technicians for command input rather than a failure to appraise the situation properly by Player One. The understanding by Players One and Four of the tactical situation was very close. The only variable that was not consistent was the extra technician for Player Four. This led to faster intercepts with available CAP aircraft. If Player One had benefited from that addition, the scenario very likely would have produced similar results.

Scenario Three showed a difference in missiles fired and a slight difference in missiles that locked on. This is probably attributed to the experience level of Player Two. Player Two had a great deal of political and military insight. It is believed that both players knew the threat axis and

responded properly. A lack of experience of Player Four in relation to Player Two led to a difference in response level. Player Two responded with forty percent more aircraft than Player Four.

4. Information Level Variance

This section deals with the differences noted between information resolution for each scenario. Table Six outlines the total missile shots for each scenario based on the information resolution used. In all cases if two identical levels of resolution were used then their results were averaged. The expected results would be that the numbers of Orange missiles fired and subsequently locked on would decrease as information resolution increased. Scenario One produced the reverse situation. This situation can be attributed to the fact that each player had an adjustment phase to the set of scenarios faced. Each player had many questions about the game which resulted in slower reactions to events in Scenario One.

In Scenarios Two and Three the number of locked-on missiles were reduced by increasing information. A trend was noted by observing the placement of forces. At Low resolution the reaction of all players was surprise at finding at least one Orange flight of bombers in a location not expected. Blue forces were usually out of position for a intercept prior to Orange Forces being able to launch their missiles. As the resolution increased in value, the AAWCs were able to predict the location of enemy flights prior to organic sources gaining contact. This allowed for more timely

intercepts which resulted in fewer missile launches and, more importantly, fewer missiles that locked on. By decreasing missile lock on, there is an obvious decrease in vulnerability of the carrier battle group.

TABLE SIX INFORMATION RESOLUTION RESULTS

	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE
LOW RESOLUTION	Missiles Fired - 7 Locked On - 0	Missiles Fired - 8 Locked On - 4	Missiles Fired - 13 Locked On - 8
MEDIUM RESOLUTION	Missiles Fired - 10 Locked On - 3	Missiles Fired - 7 Locked On - 1	Missiles Fired - 2 Locked On - 0
HIGH RESOLUTION	Missiles Fired - 11 Locked On - 6	Missiles Fired - 4 Locked On - 0	Missiles Fired - 5 Locked On - 1

* Averaged number from the two coinciding levels of resolution

5. Scenario Level Variance

Table Six offers another representation of the information collected. By averaging the number of missiles fired and locked-on for each scenario it would be expected that since each subsequent scenario contained a more intense airborne strike, the missile counts in both categories would increase. Table Seven provides an averaged calculation of the results from each scenario. The results do not indicate that increasing intensity caused increased missile firing and subsequent lock-ons. The results do indicate that Scenario One had high numbers in both recorded categories which, as

previously indicated, was probably due to its being the first one played by each player. In Scenarios Two and Three the average number of missile firings and lock-ons were reduced by the increased information resolution. This indicates that scenario difficulty does not necessarily mean increased losses by the defending forces.

TABLE 7 AVERAGED RESULTS

	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE
Missiles Fired	9.5	6.75	6.25
Missile Lock-on	3	2.25	2.5

IV. CONCLUSIONS AND RECOMMENDATIONS

1. Questions

The questions first asked in this thesis were:

1. Can a wargame simulation provide the mechanism for an accurate evaluation of communications input to a carrier battle group?

2. Can a wargame provide a generic method for acquisition planners to simulate the value of communications information in an anti-air warfare environment?

3. Will a statistical analysis of an Event Driven simulation provide a basis for the use of wargames to test proposed communications upgrades ?

In the following sections, answers to these questions will be postulated. Several ideas for the future and suggestions for updates to the current version of the RESA wargame will also be discussed.

2. Proposed Upgrades To The RESA Wargame

The game visually displays a realistic waroom appearance. When dealing with the display, the game should be capable of displaying known aircraft types and current weapons loadout, in addition to the current course, speed, and altitude which the game currently displays. This would significantly reduce the frequent and common questions asked by the AAWC. An update to the data base presentation is a major need..

Full unclassified platform capabilities need to be incorporated. Two examples will illustrate the requirement. The first is the F/A-18 fighter attack aircraft. In the RESA database this aircraft had the capability of not only carrying fuel droptanks on all wing stations to increase its poor combat

radius, but on the same aircraft a full complement of weapons could also be loaded. Also altitude had no effect on gas consumption and the maximum conserve airspeed was twenty five knots, well below minimum speed necessary for flight.

The second example is the EA-6B electronics aircraft. This aircraft was not capable of carrying the HARM anti-radiation missile and could not do both jamming and ESM collection at the same time. These are two of the obvious discrepancies that need to be addressed in future updates.

3. Communications Evaluation

In all of the analysis presented in this thesis, a certain amount of subjectivity was necessary to incorporate the human factor. The numbers do indicate that increasing the amount and quality of information does lead to a reduced missile launch count by Orange forces. By spanning four ranks within the subject players there was a level of experience that had to be considered. If the same general experience level had been used, an increased correlation of results would likely have been realized. By simulating communications nodes that more accurately represented all inputs to the carrier battle group, more detailed analysis could have been performed.

4. Acquisition Planning

If actual systems (message traffic, communications, and imagery) can be specified, then proposed communications upgrades could be simulated on a concept level and the value of these upgrades examined prior to

expenditure of research and development money. By establishing the basis for information evaluation inputs, these inputs could be translated into existing or proposed upgrades.

5. Statistical Analysis

In this thesis the analysis focused on the revealed thought process of a commander who was given information and was told to act on that information. Whenever the human factor is considered, a certain amount of subjectivity is introduced. If analysis is done on the correct Measures of Effectiveness, then the process described in this thesis can be effectively used to test current systems and proposed upgrades.

6. Recommendations For Further Study

This thesis indicates that a wargame simulation is a mechanism for evaluation of communication input to a CBG. Further study and development is necessary before the fleet receives results that are applicable. There are two areas that warrant further study. The first area is the use of the RESA simulation to be used as a trainer for the Space and Electronic Warfare Commander (SEWC) watch team. The flow of information through the watch team could be simulated with the scripting ability of the RESA simulator. This simulator could be shared by both fleets simultaneously due to the fact that RESA can share and operate from two different locations. By establishing a wargame simulation for the SEWC team, new doctrine and tactics can be established. Further areas of communications could be tried

prior to fleet installation. This would reduce the need to waste time and refits on systems that prove to be undesirable or poor fleet performers.

a. Stage One

The first step would be to establish what communications inputs are available for the SEWC watchteam. This project would entail an entire thesis. All possible communications that would be useful to the SEWC should be prioritized through the Director Space and Electronic Warfare Commander (N-6). Only by including this office for Navy consensus would the next stage have any meaning for the fleet.

b. Stage Two

The next stage would to script the major communications nodes into a script form for the RESA wargame. In order to accomplish this a student would need to observe a SEWC watch team in action to find out a suitable station layout and human communications that would be necessary. Although each watch team currently trains with a lack of established doctrine it would provide a framework to begin the study. Once this has been accomplished and the wargame tested by student for flaws, an actual watch team could be used for training. An essential link for the Naval Postgraduate School would be the Space and Electronic Warfare Commander. By working with both Atlantic and Pacific Fleet Training and fleet SEW commanders; a fleet supported method would be established. As this portion of the game progresses then additional links would be folded into the system. The entire

game may need to be elevated to higher classification level to incorporate all known sources.

c. Stage Three

The final step this thesis will propose would be to build an entire wargame modeled after the Tactical Flag Command Center. By using a wargame to train and explore new ideas and tactics, this game can help train the fleet with less actual exercise money. Although actual training can never be replaced by wargaming, more free thinking can be used when actual forces are not in danger and the full operational research field can be used to fine tune untried tactics before it necessary to engage the enemy. With the current low intensity conflict currently in vogue, there are hundreds of scenarios never imagined or tried. The wargame provides the only way we can face these new challenges without the costly mistakes that result in the unnecessary loss of life.

APPENDIX A

A. MESSAGE TRAFFIC

Scenario One, Low Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on increasing activity Scenario 1.

1) As of 0400 local time a noticeable increase in maintenance and ground communications from Cha-bahar, Jask, Bandar-Abas were observed. These communications are more intense than noted throughout the week during normal flight operations.

Scenario One, Medium Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched Scenario 1.

1) Through reliable sources, it was noted that an unusual by large number of aircraft had launched from Cha-Bahar, Jask, and Bandar-Abas. These aircraft could not be identified due to poor visibility. Time of incident just prior to sunrise local time.

Scenario One, High Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched Scenario 1.

1) It was noted that 3 flights of 5 bomber aircraft were launched from Cha-Bahar, Jask, and Bandar-Abas. They were loaded with air-to-surface missiles. The launches occurred during the early morning hours. The source was known to be accurate.

Scenario One, Low Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 1.

1) It has been confirmed that aircraft from the three bases of the previous message were launched at daybreak. The composition and course of these aircraft could not be determined; however, there were too many aircraft launched for just a reconnaissance patrol.

Scenario One, Medium Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 1.

1) Through further intelligence the aircraft launched were identified as bomber aircraft. The type and load out of these aircraft could not be ascertained. Initial course was in a southerly direction. It is assumed that these aircraft were launched due to your presence.

Scenario One, High Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 1.

1) The aircraft launched from the three bases were identified as Backfire bombers. These bombers were reported over Omanian and Iranian airspace. These overflights indicate hostile intent and should be defended as such.

Scenario Two, Low Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on increasing activity - Scenario 2.

1) After securing Ping Tung, Taiwan and Batan island regular air patrols have resumed. It has been noted that increasing ground activity was occurring around daybreak. A change of increasing presence in the South China Sea can be expected from the Chinese mainland.

Scenario Two, Medium Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 2.

1) Under the cover of darkness several unusual flights took off at daybreak from Hong Kong, Ping Tung, Taiwan and Batan island. Although identification was not possible there was too many launches for a regular patrol cycle.

Scenario Two, High Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 2.

1) Several fights of backfire bombers were launched in the early morning hours. At least 10 aircraft were launched from two of the three bases listed: Hong Kong, Pinot, and Batan island. The general course was south for all flights.

Scenario Two, Low Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 2.

1) Confirmation of increased activity in the South China Sea has occurred. Aircraft have been launched consisting of reconnaissance and bomber aircraft. These launches could be a result of your presence in the area.

Scenario Two, Medium Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 2.

1) Confirmation of aircraft launch has occurred. Identification of aircraft is limited to the flights being bomber aircraft. The course of these aircraft was south. The launches can be assumed to be related to your presence.

Scenario Two, High Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 2.

1) Confirmation of the aircraft launches has occurred. High speed bomber aircraft were noted over the Philippine Islands and Vietnam, the southern half. These overflights can be regarded as hostile intent if flight change course towards you. Assume that these aircraft are conducting a surgical strike against you.

Scenario Three, Low Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on increasing activity - Scenario 3.

1) The New Soviets have retaken the Kuril Islands. This action occurred after the resettlement by Japanese citizens. The New Soviets have increased their defense posture and reconnaissance flights. Extremely high volumes of ground and maintenance radio traffic were noted seven hours ago at Petropovlosk and in the early morning hours today at Petropovlosk, Korsa, and Okha.

Scenario Three, Medium Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 3.

1) Seven hours ago several aircraft were launched from Petropovlosk. In the early morning hours an unusual amount of aircraft were launched from Petropovlosk, Korsa, and Okha. Although visibility was not clear enough for identification it can be assumed that some strike aircraft were involved.

Scenario Three, High Resolution, First Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 3.

1) Seven hours ago reconnaissance and strike aircraft were deployed. Although composition of all aircraft was not ascertained the flights' whereabouts are unknown.

2) Petropavlovsk, Korsakov, and Okha all reported launches of bomber aircraft. These aircraft were launched at daybreak local time and their course was approximately East/Southeast.

Scenario Three, Low Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 3.

1) Confirmation of aircraft launch were noted seven hours ago. At daybreak several flights of aircraft were launched from the three bases noted in the first message. General course of these aircraft flights was east/south east.

Scenario Three, Medium Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 3.

1) Confirmation of aircraft launch seven hours ago and at daybreak are confirmed. Most, if not all, aircraft were bombers. The first flight of aircraft could not remain airborne without refueling prior to this time. General course of all aircraft initially was east/south east.

Scenario Three, High Resolution, Second Message

DTG JULXX
FM CJTG-169.5
TO CJTG-50
INFO CJTG-50.3.4 CJTE

SUBJ Intelligence report on aircraft launched - Scenario 3.

1) Confirmation of strike aircraft launched seven hours ago. Tanker aircraft were also noted as part of the package launch.

2) At least four flights of bomber aircraft were launched from the three bases previously noted in my prior message. These aircraft are assumed to be a punitive strike against the United States for intervention in the Kuril Islands.

APPENDIX B PLAYER BRIEFINGS

A. SCENARIO ONE

Due to the downsizing of Iraqi forces as a result of Operation Desert Storm, Iran has emerged from the conflict as the regional power in Southwest Asia. A massive arms procurement program has made Iran's defenses formidable. In a recent clash with Organization of Petroleum Exporting Countries (OPEC) on oil pricing, Iran has declared the Straits of Hormuz as being the territorial waters of Iran. This declaration includes all air space over the straits.

The mission of the Abraham Lincoln Carrier Battle Group is to insert the battle group through the Straits of Hormuz into the Persian Gulf and reestablish the international waterway and airway as quickly as possible. Iran has threatened to sink any ship coming in or out of the Persian Gulf. Recent aircraft patrols indicate that Iran plans to stand behind their blockade. The battle group is to expect heavy airborne resistance. Additional intelligence surmises that Iranian overflights of local neighbors may be possible due to the corrosive stance of Iran. The area map attached will give you a feel for location and bases involved.

B. SCENARIO TWO

During a recent reunification summit between China and Taiwan an argument over local forms of government has resulted in an international incident. China has decided to retake Taiwan by force. China now occupies southern Taiwan with an operational air base. In addition, China has used this opportunity to take Batan Island. China has anticipated the world's condemnation and has threatened any ship of war or aircraft operating in the South China Sea. The Lincoln battle group is to steam into the South China Sea and establish the first international presence. China's reaction to this provocation can not be estimated at this time. If engaged, the commander of the Lincoln's battle group is to engage and defend the group with vigor. The key word is to defend. Under no circumstances is the battlegroup to engage in land strike warfare without permission from higher authority. The area map attached will give you a feel for location and bases involved.

C. SCENARIO THREE

After the fall of the Soviet Union a group called the New Soviets has taken over in western Russia. In taking power the New Soviets have nullified a recent agreement to return the Kuril Islands to Japan. The Japanese have repopulated the islands only to find New Soviet troops invading their newly acquired territory. After some resistance civilian casualties were heavy. The New Soviets classify the Kuril Islands as theirs and are prepared to back their

claim. The Lincoln battle group is to test the resolve of the New Soviets and sail into the area. Although more of the fleet is steaming to the area, the Lincoln battle group will be the first on scene. Airborne attacks are likely, however, a reminder is that the battlegroup will defend itself only if attacked. This is to give the National Command Authority time to make a decision whether to engage in a regional conflict.

D. RULES OF ENGAGEMENT

Patrols of Anti-Surface Warfare (ASUW) aircraft can be expected in all scenarios. Any overt runs of these aircraft at the CBG will be warned by radio communications. This is limited to offensive platforms. If no response is given by offensive aircraft the flight may be engaged. Any hostile aircraft within weapons range will be engaged. Any surveillance aircraft may be engaged if the platform penetrates within 150 nm of the CBG. If possible, any known hostile aircraft will be engaged prior to hostile reaching maximum weapons range. Engagement range will be determined by the Battle Group Commander's assessment and resources available.

APPENDIX C THE PLAYERS

1. Player One
   Commander Randy Wight
   Instructor for the Space Systems Academic Group
   EA6-B Prowler ECMO, EW Planning Officer for the Libyan Air Strike

2. Player Two
   Captain Gordon Nagagawa (Ret.)
   Adjunct Professor Operational Analysis
   A6 Intruder Bombardier Navigator, 185+ combat missions Viet Nam, POW.

3. Player Three
   Lieutenant Commander Larry Whitmeyer
   Student NPGS, Space Operations Curriculum
   P3 TACCO, Mission Commander, 14 years experience.

4. Player Four
   Lieutenant Gary Schram
   Student NPGS, Space Operations Curriculum
   S3-B TACCO, Mission Commander, 9 years experience

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